DOCUMENT RESUME

ED 372 725 IR 015 490

AUTHOR Fang, Rong-Jyue; Hsieh, Sam Shih-Ying
TITLE A Study of High School Students' Computer Awareness in Taiwan.
INSTITUTION Jyvaskyla Univ. (Finland). Inst. for Educational Research.
PUB DATE 91
NOTE 25p.; Paper presented at the Annual Conference of the American Vocational Association (December 7, 1991).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150) -- Tests/Evaluation Instruments (160)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Achievement; Comparative Analysis; Computer Assisted Instruction; *Computer Literacy; Courseware; Foreign Countries; Grade 10; High Schools; *High School Students; Hypothesis Testing; *Interactive Video; Questionnaires; Statistical Analysis; *Student Attitudes; Tables (Data)
IDENTIFIERS *Taiwan

ABSTRACT

This study was designed to gain a better understanding of interactive video instruction and its effects on individual learning in high school students in Taiwan. The study had three objectives: (1) to identify students' background information and involvement in computer assisted instruction; (2) to assess whether there is a linear relationship between computer awareness or literacy and academic achievement; and (3) to compare the learning achievement between sequential learning and interactive learning. Fifty-six 10th-grade students were divided into two instructional groups; one received sequential instruction on computer awareness and the other received instruction on the same content via interactive video. Statistical analyses were conducted of the background information, the students' learning behavior, and their learning achievement. The learning achievement of students who received computer exposure (interactive video) and students without computer exposure (sequential) were then compared. The results indicated a high level of interest in computer assisted instruction and in computer related occupations; students with prior experience with computers scored significantly higher than those who had never learned computer awareness; and students' computer awareness came primarily from television. The results of the data analyses are presented in both narrative and tabular formats. (Contains 32 references.) (DB)

A Study of High School Students' Computer Awareness in Taiwan

Author and Presentor: Rong-Jyue Fang, Ph.D.
Professor
National Kaohsiung Normal University
116 Ho-Ping 1st Rd.,
Kaohsiung, Taiwan, 80264

Co-Author: Sam Shih-Ying Hsieh, Ph.D.
Associate Professor
National Kaohsiung Normal University
116 Ho-Ping 1st Rd.,
Kaohsiung, Taiwan, 80264

Submitted to: Cooperative Education, New & Related Services
1991 American Vocational Association Annual Conference

Paper presented in December 7th, 1991.

ABSTRACT

In 1984, the Ministry of Education in Taiwan announced the new junior high school curriculum standards that offered two computer awareness courses for junior high students. The two computer awareness courses are Applied Math (as an elective course) and Industrial Arts (as a required course). In order to cover a broader base of technology and keep the curriculum more technology oriented, the curriculum should not be very specific. In addition, the curriculum needs to be continuously changed and upgraded in keeping up with the rapid changing and advancement of computer and information technologies.

The purpose of this study was to reveal issues involving the implementation of computer awareness programs in junior high schools. There were ninety-three 10th grade students selected for participation in the study. Each of them was required to complete the computer awareness test. The questionnaire was designed to gather students' background information and their level of computer awareness. The media instruction was designed to obtain further information regarding students' exposure to computer awareness. The computer awareness test was designed to measure the level of computer awareness of each student.

The results of the study indicated that the majority of students were interested in computer-related careers and were willing to expose themselves to these field in the future. In addition, it was found that most students' computer awareness came from television than from any other sources.

Key words: courseware, interactive video instruction, computer awareness interactive videodisc, instructional evaluation.

I. Introduction

A ten-Year national plan for science and technology development was announced by the Taiwan Government in August, 1982. The development and diffusion of new information technology is one of the eight major projects in the plan. In response to these national guidelines, The Ministry of Education has set computer literacy as a top priority in educational planning.

At high school level, computer studies became available when the Ministry released the approved sysllabus in January, 1984. From september 1984, most high schools have followed the mandate and incorporated a new course entitled "introduction to computers" into the existing subjects. As the title indicates, this is an introductory course which aims to equip high school students with an awareness of the computer, its uses, its impact on society, and an understanding of BASIC programming language. There are two types of high schools in Taiwan, namely, the general high and the vocational high school. The former is for college-bound students, while the latter is for job-oriented students and has two sub-types: business and technical schools. The course "Introduction to computers" is a one-year elective subject for college-bound students, but a required subject for vocational school students.

Taiwan has a centralized system of educational governance, the computer literacy program is now supposed to be implemented in all high schools. The program is derived from a typical top-down policymaking process. However, what are the problems associated with the program? How well does this add-on subject integrate into the school curriculum? To what extent do students take advantage of learning to use this new educational technology? What are their responses? All of these questions are interesting issues with which most people concerned. Through almost five years of implementation, there is little empirical information available on this program.

At the same period of time this research team was processing interactive video-disk research and were capable of contributing parts of its research findings to evaluate the effect of this program. Therefore, this research team had spent a year (1989 academic year) to collect data from high school and to examine the college-bound program in their computer awareness implementation.

There are so many instructional systems in literature. But how good or how effective are those systems is still remain unanswered. To individualized instruction or small group instruction, "interactive video based instruction" shows very powerful in many specific studies. The reason for limited research in large group instruction mainly because of the limited resources of interactive facilities.

This study also had been confined to limited interactive instructional equipments, and could not perform large group experiment. Thus, this experiment was based on ninty three volunteer high school tenth grade students. Only fifty six of them complete the whole learning process. These fifty six students were divided into two groups. They study a series of computer awareness content, one group (sequential learning group) was instructed under traditional sequential method, the other group (interactive learning group) was instructed under interactive video method.

Purpose of the Study and Research Hypotheses

This study is designed to gain a better understanding of the interactive video instruction and its effects to individual learning through computer awareness courseware. The study consists of three main objectives:

1. To identify the background information of students and their involvement in computer related learning.
2. To assess whether there is a linear relationship between computer awareness and their learning achievement.
3. To compare the learning achievement between sequential learning and interactive learning.

Based on the objectives, this study has proposed the following null hypotheses:

1. To identify the background information of students and their involvement in computer related learning.
   - H1. Students don't have home computer at home and never learn computer operation.
   - H2. Students have not difference in contact with information media.
   - H3. Students' family member have no chance to operate computer.
   - H4. Students are not interested in computer and they also don't want to work with it in the future.
   - H5. Students are not interested in Computer Assisted Instruction.
   - H6. Students showed minimum understanding to computer terminology.

2. To assess whether there is a linear relationship between computer awareness and their learning achievement.
   - H7. Students who ever learned and those who never learned computer operation have no difference in computer awareness and computer literacy.

3. To compare the learning achievement between sequential learning and interactive learning.
   - H8. Students with different learning method have no difference in their learning achievement.
   - H9. All of instructional environment have not effects to students' learning achievement.

Definition of Terms

Computer awareness: The minimum knowledge, know-how, familiarity, capabilities, abilities, and so forth, about computers essential for a person to function well in the contemporary world (Bork, 1985).
Courseware: The part of an interactive video training or teaching course comprising the video program, and its complementary computer program, including those generating text and/or graphics.

Interactive: Involving the active participation of the user in the flow of the computer or video program. The opposite of interactive is linear (sequential).
Interactive video: The convergence of video and computer technology; a video program and a computer program running in tandem under the control of the person in front of the screen. In interactive video, the user's actions, choices and decisions genuinely affect the way in which the program unfolds.

II. Review of Related Literature

The purpose of this part is to review the literature which relates to the interactive video disc learning system and their experiment; especially, to those computer awareness experiments. This review has been divided into the following categories:

A. Video based instruction
B. Interactive video based instruction
C. Computer awareness

A. Video Based Instruction

Daynes and Butler (1984) in their study "The Videodisc Book" indicates there are more than 230 instructional methods. Among them "the interactive videodisc instruction" is one of the best training method. Bunderson, et al., (1984); Hannifin and Schaffer (1984); Gibbons, et al. (1982); Debloois (1984); and Vadas (1986) they all agree that video instruction is better than traditional method. In Bunderson, e. al. (1981) and Smith (1985) their research pin to the instruction as a whole, that video instruction could reduce the learning spent about 25%. To extra curriculum study Bunderson (1984) indicates a 41% time saved while use video as a tool of instruction. With so many literature support, a consecutive supportive study of video is, of course, vitally important. This research group intends to find out the effectiveness of the self initiated system.

B. Interactive Video Based Instruction

Savenye, W. C. & Strand, E., (1989) senses the crises among the instruction of Science, Math, and Technology. They established a "Texas Learning Technology Group (TLTG)" and proceded a micro- computer control interactive video instruction plan. The plan was supported by Texas Educational Bureau, National Science Council, and 12 Texas School Districts.

In 1987～1988 school year TLTG pretest a chemistry course in the semester period. TLTG investigates the faculty attitudes and their cooperation at that period. Twenty six faculties involoved in the Interactive Video Disc(IVD) instruction whcih makes the pretest reserved a 2,297 effective records. In the analysis of 338 students who involved in this study. Data indicates IVD students has better achievement than control group in varied factors. To selective courses IVD group has higher selective attitudes. Faculties also took it for granted that IVD should better than traditional instruction when study at the same period of time and some contents. In other words they all believe that student could learn more with the same period of time.

Milheim, W. D. (1989) intended to find out "How was the difference among students' learning activities?" He got 99 volunteer students they all took "instructional media" course. The researcher developed six interactive courses which included: basic photo taken theory for 35 milimeter camera. Learners watch the pictures and listen the sounds from videodisc. They read characters through computer operation. Instructional materials were designed and planned such as: (1) learners control the learning progresses/ computer control the learning progresses; (2) learners control the learning processes/ computer control the learning processes; (3) learners control the learning progresses/ computer control the learning processes; (4) learners control the leraning processes/ computer control the learning progresses. The researcher applied open question in all of the study items and Likert attitude scale to understand the instructional response. The results showed that students were very positive to the instruction. But statistical analysis showed no difference in all of the pairwise comparison.

Slee, E. J. (1989) skimmed over all pros and cons and supported Richard E. Clark's concepts. Mr. Clark believes that there are not true effect between media and instruction. He applied many literature to discuss the relation between media and instruction. The discussion includes four main subjects: (1) learning behavior (2) learning recognition (3) affection (4) economic and effecient. From the view points of Mr. Clark he doesn't want people to over estimate the IVD effects and under estimate its investment.

C. Computer awareness

Liang (1988) have identified five main issues while implementing computer educational programs: lack of systematic planning; insufficient computers in schools; equity in computer access; computer illiterate teachers; lack of high quality software.

Becker (1983-1984, 1986a, 1986b) survey on school computer uses in U.S.A. The statistical analysis of survey data provides useful information concerning school use of computers, including such issues as: the number and primary users of microcomputers in schools; the extent to which microcomputers are actually used in schools; how and for what purpose they are used; teachers' perceptions of computer impact on organizational, social, and academic outcomes; teachers' perceived difficulties of effective computer uses; the distrubution of computer ownership by geographic region, type of school and social-economic factors; and different patterns of computer acquisition by schools.

Sherwood (1985) employed the survey method and naturalistic inquiry in his study. Data were gathered by conducting interviews with superintendents, and from in-district observations, document searches, and questionnaires. He had very similar findings with most of the researchers. There are listed as following items:

1. At the school level, basic educational computing activities were just occuring.
2. Districts had not yet formulated written implementation plans.
3. Financial resources were inadequate to supply sufficient hardware, software, and staff development.
4. The average student-per-computer ratio was too large to offer quality educational computing.

5. Priority had been placed on instructional applications of computers, rather than administrative.
6. The computer literacy components dealt with only the basic knowledge, abilities, and skills necessary for using computers.

The study of the implementation of computer awareness is still a newly established policy research topic, with the consequence the available research literature is as yet very sparse.

III.Research Procedures

The study was designed to proceed an instructional experiment which would describe the students to the degree of their involvement in computer awareness after different learning process. Steps to achieve this purpose were discussed under the following headings:

A. Population and Sample
B. Research Instrument
C. Courseware Development
D. Instructional Experiment
E. Data Analysis

A. Population and Sample

The major considerations in the selection of the sample are the range of the group on the traits measured by the tests, and degree of selection on traits correlated with the factors. The purpose of this study is to identify factors related to the interactive learning. Thus, the wider the range the better the sample presents the whole population. But due to the limitation of interactive facilities, this study selects only those tenth grade boy students from NKNU's experiment senior high. The reason for this arrangement is owing to the school class schedule. Boy students who have chance to learn micro-computer operation and are not yet involved in when they are tenth grade.

Students from NKNU experiment senior high have only 96 boyes in tenth grade. At the time of this experiment 93 have involoved in. But only 56 of them have gone through the whole processes. Among this 56 persons 24 were randomly assigned as interactive group, the other 32 persons were assigned as linear group.

B. Research Instrument

From a variety of alternatives courseware available, this research group initiate six different instructional units. Those numbers listed behind topics are the amount of test items.

Unit 1. What is a computer (20)
Unit 2. Data and its storage in main memory (19)
Unit 3. Inputs (18)
Unit 4. Outputs (25)
Unit 5. All kinds of auxiliary memory and its traits (24)
Unit 6. Basic processing and print out (15)

Interactive Unit:

Unit 1. The first step to communicate with computer (8)
Unit 2. Character keys (6)
Unit 3. Digital keys (5)
Unit 4. Sign keys (2)
Unit 5. Other keys (11)

C. Courseware Development

Basic principles:
(a). Image display
1. Image graphics
2. Texts and description
3. Color display
(b). Contents
1. First experience
2. Connection
3. For tenth grade
4. More contents
5. Information awareness
6. Summarized content
(c). Tests:
1. Apply less instructional facilities
2. Consume less time
3. Capable of examining learning achievement

D. Instructional Experiment

A. To examine 93 students with computer literature (first unit through fourth unit)
B. To examine 56 students with unit 5 through unit 6 and keyboard awareness.
C. Compare students with and without computer exposure and its achievement difference in above test.

E. Data Analysis

Four main areas of statistical analysis were executed: (1) analysis of background information, (2) determination of students' learning behavior, (3) assess learning chievement, (4) comparison of learning achievement. Various statistical techniques were employed in this study. T-tests, means, standard deviations, correlation coefficients and frequency distributions were computed regarding students' background information. One-way analysis of variance (ANOVA) was used to determine the differences in learning behavior of students. Multiple correlation and general linear model (GLM) calculations were employed to understand the difference in learning achievement between students with interactive and linear learning.

IV. Analysis of Findings

Introduction

For a complete test form, please see Appendix A. Statistical analysis has been divided into two parts and described as following statements.

Part I: Descriptive Statistics

In order to obtain an adequate description of a mass of data, it is important:

1. To characterize what is "typical" in the group.
2. To indicate how widely individuals in the group vary.
3. To show other aspects of how the individuals are distributed with respect to the variable being measured.
4. To show the relation of the different variables in the data to one another.
5. To describe the differences among two or more groups of individuals.

As a necessary step in characterizing this population, it is required to describe the data obtained. Tabulation is a part of this step. Following tables listed the frequency distributions of those selected variates used in the study. The missing data were not included in the percentage calculation in these tables. Descriptive statistics has been separated into two parts: (A) students' background information amd computer literacy; (B) students' information concept and computer awareness.

(A). Students' Background Information and Computer Literacy:

1. My family (have a, have not) personal computer. It belongs to (whom) _____.

Table (A)1a

Personal Computer	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
have a	21	22.6	21	22.6
have not	72	77.4	93	100.0

Table (A)1b

Belongs To	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
parents	2	9.5	2	9.5
sisters & brothers	5	23.8	7	33.3
myself	13	61.9	20	95.2
others	1	4.8	21	100.0

2. My family (have a, have not) TV game set.

Table (A)2

TV game set	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
have a	40	43.0	40	43.0
have not	53	57.0	93	100.0

3. I have (ever, never) learned computer operation.

Table (A)3

Learned Computer	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
ever	42	45.2	42	45.2
never	51	54.8	93	100.0

4. My computer concept mostly comes from (Newspaper TV Magazines Broadcasting Specific Readings Specific Editorial Board Technology Reports Other Resource_____.

Table (A)4

Items	Response	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
Newspaper	Yes	31	33.3	31	33.3
	No	62	66.7	93	100.0
TV	Yes	33	35.5	33	35.5
	No	60	64.5	93	100.0
Magazines	Yes	33	35.5	33	35.5
	No	60	64.5	93	100.0
Broad-casting	Yes	2	2.2	2	2.2
	No	91	97.8	93	100.0
Specific Readings	Yes	24	25.8	24	25.8
	No	69	74.2	93	100.0
Specific Editorial Board	Yes	10	10.8	10	10.8
	No	83	89.2	93	100.0
Tech-nology Reports	Yes	30	32.3	30	32.3
	No	63	67.7	93	100.0
othther Resources	School & Teachers	10	10.9	10	10.9
	Brothers & Sisters	1	1.1	11	12.0
	Classmates & Peer Group	9	9.8	20	21.7
	Others	4	4.3	24	26.1
	No Resources	68	73.9	92	100.0
	Missing = 1				

5. My family member (have, have not) involved in computer related occupations.

Table (A)5

Family Involved	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
have	10	10.9	10	10.9
have not	82	89.1	92	100.0
	Missing = 1			

6. I (am, am not) interested in computer related occupations. And I (will, will not) involved in computer related occupations.

Table (A)6a

Interested In Computer	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
am	85	92.4	85	92.4
am not	7	7.6	92	100.0
	Missing = 1			

Table (A)6b

Involved In Computer	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
will	72	81.8	72	81.8
will not	16	18.2	88	100.0
	Missing = 5			

7. I (do, do not) believe CAI is interesting and it (may, may not) attract my attention.

Table (A)7a

CAI Interesting	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
do	82	88.2	82	88.2
do not	11	11.8	93	100.0

Table (A)7b

Attract My Attention	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
May	85	91.4	85	91.4
May not	8	8.6	93	100.0

8. I (know, don't know) what is CAI.

Table (A)8

What is CAI	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
know	46	50.5	46	50.5
don't know	45	49.5	91	100.0
	Missing = 2			

9. I (know, don't know) that "data" been sorted and rearranged as needed is called "information".

Table (A)9

Know Information	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
know	36	39.1	36	39.1
don't know	56	60.9	92	100.0
	Missing = 1			

10. Please check the following terminology which you understand its meaning.
CPU_____ RAM_____ ROM_____ Analog_____ Digital_____
Programming Language_____ CRT_____ Keyborad_____
Data Bank_____ Printer_____

Table (A)10

Items	Response	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
CPU	Yes	6	6.5	6	6.5
	No	87	93.5	93	100.0
RAM	Yes	12	12.9	12	12.9
	No	81	87.1	93	100.0
ROM	Yes	11	11.8	11	11.8
	No	82	88.2	93	100.0
Analog	Yes	3	3.2	3	3.2
	No	90	96.8	93	100.0
Digital	Yes	26	28.0	26	28.0
	No	67	72.0	93	100.0
Program-ming Language	Yes	39	41.9	39	41.9
	No	54	58.1	93	100.0
CRT	Yes	0	0.0	0	0.0
	No	93	100.0	93	100.0
Keyboard	Yes	88	94.6	88	94.6
	No	5	5.4	93	100.0
Data Bank	Yes	55	59.1	55	59.1
	No	38	40.9	93	100.0
Printer	Yes	73	78.5	73	78.5
	No	20	21.5	93	100.0

(B). Students' Information Concept and Computer Awareness:

1. I (can, can not) read programs and do the simple programming.

Table (B)1

Read & Programming	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
can	20	21.5	20	21.5
can not	73	78.5	93	100.0

2. I (can, can not) operate CAI software.

Table (B)2

Operate CAI Software	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
can	19	20.7	19	20.7
can not	73	79.3	92	100.0
	Missing = 1			

3. I (am, am not) familiar with computer hardware and software terminology.

Table (B)3

Familiar Terminology	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
am	14	15.1	14	15.1
am not	79	84.9	93	100.0

4. I (know, don't know) computer limitations on educational application.

Table (B)4

Computer Limitations	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
know	24	25.8	24	25.8
don't know	69	74.2	93	100.0

5. I (can, can not) find educational related computer software.

Table (B)5

Find Software	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
can	14	15.1	14	15.1
can not	79	84.9	93	100.0

6. I (can, can not) tell computer developing history and its educational related development.

Table (B)6

Developing History	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
can	16	17.2	16	17.2
can not	77	82.8	93	100.0

7. I (am, am not) caplable of understanding computer interaction to the society (especially to the education).

Table (B)7

Computer To Society	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
am	51	55.4	51	55.4
am not	41	44.6	92	100.0
	Missing = 1			

8. Please check the following terminology which you understand its meaning.

Programming_____ Programming Language_____
Program Debug_____ System Software_____ Magnetic Tape_____
Artificial Intelligence_____ Robotics_____
Computer Simulation_____ Expert System_____
Knowledge Bank_____

Table (B)8

Item	Response	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
Program-ming	Yes	66	71.0	66	71.0
	No	27	29.0	93	100.0
Program-ming Language	Yes	39	41.9	39	41.9
	No	54	58.1	93	100.0
Program Debug	Yes	11	11.8	11	11.8
	No	82	88.2	93	100.0
System Software	Yes	29	31.2	29	31.2
	No	64	68.8	93	100.0
Magnetic Tapes	Yes	42	45.2	42	45.2
	No	51	54.8	93	100.0
Arti-ficial Intelli-gence	Yes	22	23.7	22	23.7
	No	71	76.3	93	100.0
Robotics	Yes	73	78.5	73	78.5
	No	20	21.5	93	100.0
Computer Simula-tion	Yes	31	33.3	31	33.3
	No	62	66.7	93	100.0
Expert System	Yes	2	2.2	2	2.2
	No	91	97.8	93	100.0
Knowledge Bank	Yes	24	25.8	24	25.8
	No	69	74.2	93	100.0

9. I (believe, don't believe) that the basic computer courses could be arranged in high school.

Table (B)9

Computer Courses	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
believe	86	100.0	86	100.0
don't believe	0	0.0	86	100.0
	Missing = 7			

10. My family members (are all, are not) interested in computer awareness.

Table (B)10

Interested In Awareness	Frequencies	Percentage	Cumulated Frequencies	Cumulated Percentage
are all	48	65.8	48	65.8
are not	25	34.2	73	100.0
	Missing = 20			

Part II: Statistical Analysis and Tests

Objective I:

1. To identify the background information of students and their involvement in computer related learning.

H1. Students don't have home computer at home and never learn computer operation.

In testing this hypothesis, "Student T Test" was used. A summary of the results is presented in Table (I)H1. The result had showed a post-hoc probability of .05. Therefore, it was concluded that the null hypothesis should be rejected.

Table (I)H1 Student T Test

Observation	Variates	Means	Standard Deviation	Standard Error	T Value	Probability > |T|
93	owned personal computer	0.23	0.42	0.04	5.18	0.0001
	learn computer operation	0.45	0.50	0.05	8.70	0.0001

H2. Students have not difference in contact with information media.

According to the distribution of frequency categories, some has less than 5 observations which easy to cause the misleading results and is omitted in data analysis. We can tell from the descending percentage: TV and Magazine (35.5%); Newspaper (33.3%); Technology Reports (32.3%); Other Resources (26.1%); Specific Reading (25.8%); Specific Editorial Board (10.8%); Broadcasting (2.2%). In "Other Resources" which included: "School & Teachers" (10.8%); "Classmates & Peer Groups" (9.8%); "Others" (4.3%); "Brothers & Sisters" (1.1%).

H3. Students' family member have no chance to operate computer.

From the Student T Test, it was concluded that students' family member have chance to operate computer (see Table (I)H3).

Table (I)H3 STUDENT T TEST

Observation	Variates	Means	Standard Deviation	Standard Error	T Value	Probability > |T|
93	chance to operate computer	0.11	0.31	0.03	3.33	0.0013

H4. Students are not interested in computer and they also don't want to work with it in the future.

From the Student T Test, it was concluded that students were significantly interested in computer and they also do want to work with it in the future (see Table (I)H4).

Table (I)H4 STUDENT T TEST

Observation	Variates	Means	Standard Deviation	Standard Error	T Value	Probability > |T|
93	interested in computer	0.92	0.27	0.03	33.24	0.0001
	want to work with in future	0.82	0.39	0.04	19.79	0.0001

H5. Students are not interested in Computer Assisted Instruction.

From the Student T Test, it was concluded that students were significantly interested in Computer Assisted Instruction and they also do believed that they would pay attention to it or be attracted by its instruction (see Table (I)H5).

Table (I)H5 STUDENT T TEST

Observation	Variates	Means	Standard Deviation	Standard Error	T Value	Probability > |T|
93	interested in CAI	0.88	0.32	0.03	26.19	0.0001
	Attract My Attention	0.91	0.28	0.03	31.26	0.0001

H6. Students showed minimum understanding to computer terminology.

Students' understanding to computer terminology are varied. If listed according to the understanding percentage, the descending order would be look like this: Keyboard (94.6%); Printer and Robotics (78.5%); Programming (71.0%); Data Bank (59.1%); Magnetic Tapes (45.2%); Programming Language (41.9%); Computer Simulation (33.3%); System Software (31.2%); Digital (28.0%); Knowledge Bank (25.8%); Artificial Intelligence (23.7%); RAM (12.9%); Program Debugging and ROM (11.8%); CPU (6.5%); Analog (3.2%); Expert System (2.2%); CRT (0%) (see Table (A)10 and Table (B)8).

Objective II:

2. To assess whether there is a linear relationship between computer awareness and their learning achievement.

H7. Students who ever learned and those who never learned computer operation have no difference in computer awareness and computer literacy.

T Test rejected this null hypothesis. Students who owned a personal computer and those who don't have a computer have a significant difference in both awareness and literature. Also, Students who ever learned computer operation have significant difference in both awareness and literature (see Table (II)H7a-d).

------- Table (II)H7a TTEST PROCEDURE -------

Variable: COMPUTER LITERACY

LEARNED COMPUTER	N	Mean	Std Dev	Std Error	Minimum	Maximum
EVER	42	12.47619048	2.63409257	0.40644931	5.00000000	17.00000000
NEVER	51	9.78431373	3.28215615	0.45959379	3.00000000	17.00000000

Variances	T	DF	Prob>|T|
Unequal	4.3875	90.9	0.0001
Equal	4.2955	91.0	0.0000

For H0: Variances are equal, F' = 1.55 DF = (50,41) Prob>F' = 0.1492

------- Table (II)H7b TTEST PROCEDURE -------

Variable: COMPUTER AWARENESS

LEARNED COMPUTER	N	Mean	Std Dev	Std Error	Minimum	Maximum
EVER	38	61.02631579	5.82393404	0.94476686	45.00000000	72.00000000
NEVER	49	57.34693878	6.25683300	0.89383329	30.00000000	66.00000000

Variances	T	DF	Prob>|T|
Unequal	2.8290	82.1	0.0059
Equal	2.8032	85.0	0.0063

For H0: Variances are equal, F' = 1.15 DF = (48,37) Prob>F' = 0.6558

------- Table (II)H7c TTEST PROCEDURE -------

Variable: COMPUTER LITERACY

PERSONAL COMPUTER	N	Mean	Std Dev	Std Error	Minimum	Maximum
HAVE	21	12.57142857	3.02607714	0.66034417	3.00000000	17.00000000
DON'T HAVE	72	10.54166667	3.22812246	0.38043788	3.00000000	17.00000000

Variances	T	DF	Prob>|T|
Unequal	2.6634	34.4	0.0117
Equal	2.5698	91.0	0.0118

For H0: Variances are equal, F' = 1.14 DF = (71,20) Prob>F' = 0.7740

-------- Table (II)H7d TTEST PROCEDURE --------

Variable: COMPUTER AWARENESS

PERSONAL COMPUTER	N	Mean	Std Dev	Std Error	Minimum	Maximum
HAVE	20	61.40000000	4.87096662	1.08918125	51.00000000	72.00000000
DON'T HAVE	67	58.22388060	6.53387651	0.79824006	30.00000000	70.00000000

Variances	T	DF	Prob>|T|
Unequal	2.3520	41.4	0.0235
Equal	2.0102	85.0	0.0476

For H0: Variances are equal, F' = 1.80 DF = (66,19) Prob>F' = 0.1531

This study applied GLM method to find out whether there is a linear relationship between computer awareness and their learning achievement. The students were devided into interactive and linear group to test their achievement for same course contents. The result were shown in Table (II)H7e. The GLM test retained the null hypothesis. We couldn't conclude that there is a linear relation between learning achievement and computer awareness. However, further statistical analysis proved that there is linear relationship between computer awareness and learning experience.

-------- Table (II)H7e GLM PROCEDURE --------

Dependent variable: Computer Awareness (interactive vs. linear)
Unit 5,6 and Keyboard section

Source	DF	Sum Square	Mean Square	F Value	Pr > F
Model	2	188.721028	94.360514	3.13	0.0522
Error	50	1505.354443	30.107088		
Corrected Total	52	1694.075471			

R-Square	C.V.	MSR Square	Computer Awareness Test Mean
0.111401	10.525176	5.4869927	52.132075

Objective III:

3. To compare the learning achievement between sequential learning and interactive learning.

H8. Students with different learning method have no difference in their learning achievement.

T Test rejects the null hypothesis. Students with interactive learning significantly have higher achievement score than students with linear learning method.

------- Table (III)H8 TTEST PROCEDURE -------

Variable: COMPUTER LITERACY

GROUP	N	Mean	Std Dev	Std Error	Minimum	Maximum
INTERACT	25	12.24000000	3.13953287	0.62790657	5.00000000	17.00000000
LINEAR	32	9.40625000	3.27117790	0.57826802	3.00000000	14.00000000

Variances	T	DF	Prob>|T|
Unequal	3.3197	52.7	0.0016
Equal	3.3027	55.0	0.0017

For H0: Variances are equal, F' = 1.09 DF = (31,24) Prob>F' = 0.8455

H9. All of instructional environment have not effects to students' learning achievement.

All of the variates which could affect computer awareness were listed below. Table (III)H9a presented variates, sample size, means, standard deviation, sum, minimum, and maximum value.

------- Table (III)H9a VARIATES -------

VARIATES	N	MEANS	STANDARD DEVIATION	SUM	MINIMUM	MAXIMUM
YES NO*	93	5.66667	2.00723	527.00000	0	10.00000
MULTIPLE*	93	5.33333	1.91863	496.00000	1.00000	10.00000
UNIT 1	87	12.43678	1.81532	1082	6.00000	16.00000
UNIT 2	87	14.88506	2.56282	1295	10.00000	19.00000
UNIT 3	87	14.36782	2.98101	1250	0	18.00000
UNIT 4	87	17.26437	2.84261	1502	0	22.00000
MATH	93	63.79570	11.96331	5933	26.00000	89.00000
PHYSICS	93	75.78495	6.18000	7048	50.00000	90.00000
TOTAL	93	73.21613	4.83743	6809	56.90000	82.90000
ANA MATH	93	37.35484	6.76732	3474	13.00000	53.00000
IQ TEST	90	106.04444	14.87394	9544	67.00000	136.00000

YES NO -- Means computer literacy test "Yes No" part
MULTIPLE -- Means computer literacy test "Multiple" part

Through GLM method; Math, Physics, Total, IQ Test all rejected the null hypotheses. Which provided us an evidence that all these variates do have significant effects on computer awareness.

V. Summary and Conclusion

Summary

This study developed questions according to computer awareness course contents defined by this research team. Two types of questions were set up to investigate the understanding of students' computer awareness. Study also had been confined by its limit facilities. Thus, the experiment was proceeded under a separate period with a consecutive grouping. The total amount of students participated in this study were 93. Those who completed two different types of instruction were 24 for interactive and 32 for linear instruction.

Findings

The findings drawn from this study are presented below, divided into descriptive statistics and hypotheses.

Descriptive Statistics

1. Among 93 students, 21 of them have home computer.
2. Forty two students (45.2%) have learned computer operation.
3. Listed according to the descending percentage, students have their computer knowledge from: TV and Magazine (35.5%); Newspaper (33.3%); Technology Reports (32.3%); Other Resources (26.1%); Specific Reading (25.8%); Specific Editorial Board (10.8%); Broadcasting (2.2%). In "Other Resources" which included: "School & Teachers" (10.8%); "Classmates & Peer Groups" (9.8%); "Others" (4.3%); "Brothers & Sisters" (1.1%).
4. About 10.9% of family members involved in computer related occupations.
5. 92.4% students were interested in computer related occupations. 81.8% students were willing to participate in computer related occupations in the future.
6. 88.2% students were interested in Computer Assisted Instruction. 91.4% students believed that they would be attracted by CAI.
7. Nearly half of students (50.5%) believed that they know what is CAI.
8. Students who know what is "information" occupied 39.1%.
9. Students' understanding to computer terminology are varied. If listed according to the understanding percentage, the descending order would be look like this: Keyboard (94.6%); Printer and Robotics (78.5%); Programming (71.0%); Data Bank (59.1%); Magnetic Tapes (45.2%); Programming Language (41.9%); Computer Simulation (33.3%); System Software (31.2%); Digital (28.0%); Knowledge Bank (25.8%); Artificial Intelligence (23.7%); RAM (12.9%); Program Debugging and ROM (11.8%); CPU (6.5%); Analog (3.2%); Expert System (2.2%); CRT (0%).
10. 21.5% of students who can read programs and do the programming.
11. 20.7% of students who believed that they know how to select and operate educational software.
12. 15.1% of students who were familiar with computer hardware and software terminology.
13. 25.8% of students who believed that they know the computer limitations on educational application.
14. 15.1% of students who believed that they can find deucational related computer software.
15. 17.2% of students who believed that they can tell computer developing history and its educational related development.

16. 55.4% of students who believed that they are capable of understanding computer interaction to the society.
17. All of students believed that basic computer concepts could be arranged in high school.
18. 65.8% of students believed that their family were interested in computer awareness.

Hypotheses

1. T Test showed that students who ever learned computer operation had scored significantly higher than those who never learned in awareness achievement.
2. GLM test showed that interactive learning significantly better than linear learning in achievement score.
3. Correlation Cofficients indicates that 'Physics & Chemistry' score have very high correlation with computer awareness score. GLM test showed that students' 'Math', 'IQ test', and 'Total' score all have significant effects to computer awareness achievement.

Conclusion

The following are conclusions drawn from this study:

1. There were so many interactive videodisc system been mentioned in the literature. Wang, Y. T. (王燕超, 1987); Buttery, T. J. & Parks, D. (1988); Dennee, J. (1988) all had clearly described the functions and limitations of interactive videodisc. Only a few of these instruction systems actually applied in computer awareness instruction or case study. This research provides an example for computer awareness experiment in video-disc learning.

2. Meskill, C. (1988) believed that computer assisted instruction should consider: (1) environment; (2) vision; (3) time. Further, he added that environment should be dynamic, flexible, challenging, and sequential; vision must be easy to understand; and have the best control of time to cope with the learners' psychological response to get the best results. This study try to have everything under control as the study went on. As the matter of facts it was not easy (with limited facilities and without administrative cooperation it is almost impossible).

3. Seal, W. C. (1988); Pollak, R. A.; & Breault, G. (1987) Dalton, D. W.; Hannafin, M. J. (1987) all supported that a well designed videodisc instruction could help students to the best. This has been, again, supported by this study.

4. The study indicated that the majority of students were interested in computer-related careers and were willing to expose to it in the future. Furthermore, it was found that most students' computer awareness came from television than from any other sources.

REFERENCE

Atkins, M.; & Blissett, G. Learning activities and interactive videodisc: An exploratory study. British Journal of Educational Technology, v20, n1, pp.47-56, Jan. 1989.

Bailey, H. J.; Klinsing, S. Employability skills: using interactive video to keep students working. Technological Horizons in Education, v15, n7,pp.79-81, Mar. 1988.

Beausys, M. M. Video development: No lone rangers, please. Training, v25, n2, pp.65-68, Feb. 1988.

Becker, H. C. (1983-1984) School use of microcomputers: Reports from a national survey. Issues nos. 1-6. Baltimore, MD: Johns Hopkins University.

Becker, H. J. (1986a) Instructional uses of school computers: Reports from the 1985 national survey. Issues nos. 1-3. Baltimore, MD: Johns Hopkins University.

Becker, H. J. (1986b) Our national report card: Preliminary results from the new Johns Hopkins survey. Classroom Computer Learning, 6(4), 30-33.

Bork, A. Personal Computers for Education. New York: Harper & Row, Publishers, 1985.

Bunderson, C. V., Baillio, B., & Olsen, J. B. instructional effectiveness of an intelligent videodisc in biology. Machine Mediated Learning, I(2), 175-215, 1984.

Bunderson, C. V., Olsen, J. B., & Baillio, B. Proof-of-concept demonstration and comparative evaluation of a prototype intelligent videodisc system. Orem, Utah: WICAT SYSTEMS (MIMEO), 1981.

Buttery, T. J.; Parks, D. Instructive innovation: Interactive Videodisc systems. Reading Improvement, v25, n1, pp.56-59, Spr. 1988.

Copeland, P. Interactive video: What the research says. Media in Education and Development, v21, n2, pp.60-63, Jun. 1988.

Dalton, D. W.; & Hannafin, M. J. The Effects of Video-Only, CAI only, and interactive video instructional systems on learner performance and attitude: An Exploratory Study. U.S.: Indiana, 1986.

Dalton, D. W.; Hannafin, M. J. The effects of knowledge versus context-based design strategies on information and application learning from interactive video. Journal of Computer Based Instruction, v14, n4, pp.138-41, Fall 1987.

Daynes, R., & Butler, B. The Videodisc Book: A Guide and Directory, New York: John Wiley & Sons, Inc., 1984.

Dennee, J. Interactive videodisc: A new instructional technology. Business Education Forum, v42, n6, pp.3-5, Mar, 1988.

Duke, J. Interactive Video: Implications for Education and Training. Council for Educational Technology, U. K.: London, 1983.

Gibbons, A. S., Olsen, J. B., & Cavagnol, R. M. Hawk training system: Evaluation Report WICAT systems, Inc. Orem, Utah,: Author, May, 1982.

Hannafin, M. J. & Schaffer, L. The effects of systematically varied interactivity on learning from interactive video. Paper presented at the meeting of the American Educational Research Association, New Orleans, LA., April, 1984.

Hasselbring, T.; & and others. An evalustion of level one instructional videodisc program. Journal of Education Technology System, v16, n2, pp.151-69, 1987-88.

Liang, H. C. A study of the Implementation of a computer literacy program in Taiwan. Unpublished doctor dissertation, Urbana, Univ. of Illinois, 1988.

Mashiter, J. Interactive video in science. School Science Review, v69, n248, pp.446-50, Mar 1988.

Meskill, C. Interactivity in CALL courseware design. CALICO Journal, v5, n1, pp.9-14, Sep. 1987.

Milheim, W. D. (1989) Perceived Attitudinal Effects of Various Types of Learner Control in an Interactive Video Lesson. U.S.: Ohio.

Pollak, R. A.; & Breault, G. Improving teacher effectiveness through the use of interactive microcomputer videodisc instruction. Education and Computing, v3 n3-4, pp.213-18, 1987.

Savenye, W. C. & Strand, E., (1989) Teaching Science Using Interactive Videodisc: Results of the Pilot Year Evaluation of the Texas Learning Technology Group Project. U.S.: Texas.

Seal, W. C. Interactive video system: Their promise and Educational potential. Teachers College Record, v89, n3, pp.373-83, Spr. 1988.

Sherwood, M. G. (1985) The implementation of educational computing in twelve Missouri school districts. Unpublished Doctoral dissertation, Univ. of Missouri- Columbia, 1984.

Slee, E. J. (1989) A Review of the research on Interactive Video. U.S.: New York.

Smith, E. E. Interactive video: An examination of use and effectiveness. Journal of Instructional Development, V10, n2, pp.2-10, 1987.

Smith, R. C. Full-scale pilot testing of Florida's videodisc training project. Pensacola, FL: Univ. of west Florida, Office for Interactive Technology and Training, September, 1985.

Taylor, T. D.; & and others. Interactive video authoring systems. Optical Information Systems, v7, n4, pp.282-300, Jul-Aug. 1987.

Wang, Y. T.

王燕超　交談式影碟微電腦系統課程軟體發展研究，國立臺灣師範大學工業教育研究所碩士論文，民國七十六年六月。